pelago of Terra del Fuego offers for the existence of man, even compared to the neighboring regions on the American continent, we ask what cause has persuaded the Fuegians to establish themselves there. To-day it is beyond doubt that these people are not negroes, as Bory Saint-Vincent believed, but that they belong to an Ando-Peruvian race which inhabits the Andes and a part of the pampas of Chili. They probably occupied, in olden times, the northern banks of the straits of Magellan, and are but a remnant of the Aucas and the Araucanos of Chili. Attacked by the Patagonians of the pampian race, not as strong and more poorly armed than their adversaries, they were obliged, at a time more or less remote, to yield the place to their redoubtable enemies and to take refuge in the inhospitable regions on the other side of the strait, where the Patagonians, detestable navigators, left them in quiet.

Then little by little have acted the forces of adaptation, which all-powerful habit, in returning their hereditary effects, have adapted the Fuegians to the climate and productions of their miserable country.

Their industry is modified in the same way, and to-day it is reduced to the construction of miserable boats, and to the manufacture of several weapons and utensils necessary to their sad existence. The boat built of a mass of shapeless pieces of wood, covered with canvas in the shape of the skins which they customarily employ, the boat which can be seen on the basin in the neighborhood of their enclosure, makes us shudder when we think that these savages venture in this frail machine on the agitated waters which wash their country. In regard to the collection of arms and utensils which can be seen in a neighboring shed, it indicates a certain ingenuity, but shows well to what a miserable condition these poor creatures are reduced.

These Fuegians, eleven in number, four men, four women, and three children, have been brought to Europe by M. Waalen, established for many years at Punta-Arenas, capital of Patagonia.

M. Waalen, who goes to fish for seals in the waters of Terra del Fuego, finds himself in connection with these savages. He was able, by gorging them with food, by treating them with prudence, for they are not always tractable and would be able to cause great obstructions, to induce them to remain on his ship, from which they were transshipped on a Hamburg steamer which makes the passage between Valparaiso and Europe. It was while the ship touched at Havre that M. Geoffroy Saint Hilaine, informed by a despatch, saw them and bronght them here. M. Waalen deposited in the hands of the Chilian Governor of Punta-Arenas, a sum of 12 to 15,000 francs, as security, binding himself to return these savages to their country after they had made a tour through the principal capitals of Europe.

What impression will they carry back of their sojourn among civilized people? If we are to judge of this by the Fuegians that Captain Fitz-Roy returned after a sojourn of three years in Europe, the impression will be a very fleeting one. These natives, three in number, two men, York Minster and Jemmy Button, and a young girl, Fuégia, seemed almost entirely civilized. Captain Fitz-Roy landed them in the middle of their tribes, furnished them with implements and tools of all sorts, built them a house, cleared up a corner of ground, and left them in the company of a missionary. When he returned, several months after, he found no trace of their installment, and had to take on board the poor missionary, who ran the greatest danger. Of his three pioneers, two, York Minster and Fuégia who became his wife, parted in plundering their comrade, and the latter, who had taken a wife in his tribe, became a filthy and disgusting savage, delighted with his condition, scarcely knowing how to speak English, and who showed with pride to the officers of the expedition the implements of bone and of flint which he had manufactured.

It seems, after this experience, that it is impossible to draw these savages from their debasement, and yet they have an intellectual capacity, latent, it is true, which appears superior to that of Australians. They learn languages with remarkable facility, and have a spirit of imitation carried to extremes, which ought to be utilized in order to teach them things well. The future will tell us if those who are at present in the Garden of Acclimation, will derive any profit from their sojourn among us. Our opinion is that they will be delighted at finding themselves in their own homes, and the remembrance of all that they will have seen will remain in their minds as a dream which will not perhaps be wholly agreeable.—(*Translated from La Nature.*)

ON A NEW SYSTEM OF BLOWPIPE ANALYSIS.*

By Lieut.-Colonel W. A. Ross (late R. A.)

(1) THE USE OF ALUMINIUM PLATE FOR VOLATILIZING SUBSTANCES.

Volatile metals and sulphur compounds, &c., are, in the old system, treated before the blowpipe, as is well known, upon the support of a parallelopiped of charcoal held horizontally in the direction of the blast from the blowpipe, the disadvantages of which are: (*a*) that *black* sublimates as those now known to be obtainable from arsenic, antimony, lead, &c., are undistinguishable on the black charcoal. (*b*) The greater part of the sublimate from most volatile metals is blown away by the blast—a serious objection when, as is often the case, there is only a trifling proportion of such metals present in a mineral or compound. (*c*) When the charcoal becomes incandescent, the most interesting portion of the sublimate (that next the assay) is often thus resublimed and lost. (*d*) The white charcoal ash is so mixed up with sublimates as often to conceal them, and, in cases of minute quantities, to mislead the operator into supposing there is a sublimate at all. (*e*) In the treatment of a compound containing two or more volatile metals, sulphides, or oxides, the sublimates obtained therefrom are mechanically, and perhaps sometimes chemically, combined, and then cannot be separated, so as to be distinguished from each other, by means of the blowpipe, or in any other way at the time, on the spot. (*f*) It is impossible to obtain a blowpipe sublimate from charcoal free from the silica, &c., of the ash, by scraping it off for supplementary examination. (*g*) Most charcoals, after blowpipe treatment for any length of time, split up into cracks and deep fissures, into which the sublimate or the assay falls and is lost.

Here are several objections to the use of charcoal as a blowpipe support; most of them serious, some fatal to a thorough pyrological examination of volatile substances; and yet it has obtained ever since Von Swab invented the chemical employment of the blowpipe in 1738 (in which year he thus treated an ore of zinc at Delarne in Sweden), and is still used at Freiberg.

In 1869 Napoleon III had offered, or I understood him to have offered, a premium of £1000 to any one who could discover an efficient solder for aluminium, and being then on sick-leave in India, I thought of employing my leisure in attempting this discovery.†

After investigation, I imagined (from burning my fingers so often), that the reason an aluminium solder could not be made, was the enormous heat-conducting powers of the metal, which transferred the heat from a blowpipe-flame so quickly away over the entire substance of a fragment of given bulk, that no one part of it could

*British Association, York, 1881.

† In reply to a question, Col. Ross answered that he had not discovered a new solder, but that on one occasion last year (1880) he actually did succeed in soldering two small pieces of aluminium together, and that he has a description of the process in his notes.

be raised to the fusing-point, so that, although small portions of almost every other metal or alloy could be readily fused upon it, even the most fusible, such as antimony, bismuth, &c., could not be made to combine with the aluminium.

As I had then studied blowpipe analysis on the Freiberg system for ten years, it was obvious to me that, although I had no chance of otaining the £1000, the facts thus ascertained might be utilized so as to make aluminnum plate or foil remedy in part, at all events, the disadvantages above described of charcoal as a blowpipe support.

I found that arsenic, antimony, bismuth, &c., the fusion of the smallest particle of which upon platinum is so fatal to it could be treated without the slightest danger before the blowpipe upon aluminium, which metal also, probably from the reason above given, withstood heat concentrated upon any point, in direct proportion to the bulk of the fragment used as a support.

I found that some volatile metals, as *e. g.*, antimony, would not yield a sublimate when treated before the blowpipe upon the bare aluminium plate, but readily did so when a small slip or lozenge of charcoal was placed between the assay and the aluminium. Here, then, was a rapid and effectual means of *separating* the pyroxides or sublimates obtainable from a compound, for instance, of antimony and arsenic; the latter subliming readily upon the bare aluminium plate; the former only after treatment upon a charcoal slip.

The horizontal charcoal support was, of course, changed into a perpendicular one, in direct opposition to the blast from the blowpipe, so as to catch all sublimates of every kind; the grey-colored, shining aluminium betrayed at once the faintest sublimates, whether black or white; these, again, could be readily treated by the oxidizing or reducing flame of the blowpipe on the aluminium, where they thus afforded, in most cases, new and characteristic reactions; the perpendicular aluminium could be graduated by a scale showing the different specific gravities of sublimates by their mean ascension on the plate, unacted upon by the blast as in the case of charcoal; and finally, any portion of a sublimate could be easily and cleanly scraped off with a penknife, so as to be afterwards examined in any way desired.

Another advantage I found, referrable, I presume, to the same cause (of superior heat-conduction in the support) is that the alkaline carbonates, so often used in blowpipe analysis, as in the detection of manganese, for instance, assume, when treated before the blowpipe on aluminium, a globular shape, and that the resulting bead or ball of sodium or potassium carbonate, can be readily picked, when cool, off the plate with forceps, instead of lying in a kind of pool and sticking to the metal as they do in the case of platinum foil.

To other uses of aluminium plates, as in flattening blowpipe beads and their contents for microscopical purposes, I have not time to allude.

(2) A NEW AIR-RESERVOIR MOUTH BLOWPIPE (CALLED BY ME A "PYROGENE.")

A member of the Royal Geological Survey of England told me in Jermyn street, that he believed many geologists and mineralogists were deterred from using this important little instrument by the trouble if not difficulty of blowing, and for a long time I tried to discover some means of obviating this difficulty in vain. At last, one day, in the Zoological Gardens of London, looking reflectively at the antics of some anthropoid types of our ancestors there, I could not help feeling a kind of regret that the process of "Natural Selection" should have eventually deprived my race of the pouch under the jaw, no doubt at one time possessed by them, which would have served so admirably as an air-reservoir in using the blowpipe, and it suddenly struck me that I could partially remedy the defects of specific development in this matter, by applying an elastic air-reservoir of indiarubber to the ordinary mouth-blowpipe.

Here is the result. I have made it of a simple tube-like form, instead of the usual tapering one, as seen in Black's blowpipe, because I had to adapt it to be packed in a cigar-case like this, the only way of effecting which was to have it in a telescopic arrangement, opening and shutting thus: and this arrangement had another advantage, that, namely, of adapting the length of the instrument to the differing optical focus of differing vision.

For the jet I took Wollaston's ingenious idea of passing the stem of the blowpipe through the arm of the jet; only instead of doing that, it suited my purpose better to pass the jet through the stem of the blowpipe thus. Of course, in either case, the inserted tube must fit air-tight —an easy matter to effect. Over the throat of the mouth-piece is tied a piece of oiled silk, which acts as a valve, preventing the return of the breath into the cheeks. In this manner all difficulty in blowing is entirely removed, and even a child can use this blowpipe, because all he has to do is to blow through the valve till the air-bag is filled; then he can stop until the pressure of the blast begins to slacken, when a few more breathings will refill the bag. The blast pressure from the bag may also be increased by the operator placing it between himself and the table, and gently pressing the bag with his body, which he can easily do while using this apparatus.

I have only to add that, as you observe, the jet and air-bag fit for packing into the tube of the blowpipe itself, for which purpose there is no necessity, as in the one I have here, to make the end screw off, as all one has to do is to draw the telescopic arrangement out altogether, and, slipping in the jet and bag, to shut it up again; this, of course, would make the article cheaper. Griffin makes them (with the screw end) for, I believe, half a crown, but, of course, any ordinary mechanic could make such a blowpipe for himself for a few pence.

(3) THE PYROLOGICAL CANDLE.

I begin a brief description of this fuel with the remark that it is practically impossible for the traveller to use gas of any kind—not even petroleum gas—as fuel, on account of the difficulties of carriage. The same remark applies, but in another way, to oil of any description. A bottle of this is no doubt, easily carried, but is very apt to leak at the cork, and so to spoil any or most articles near it in a box.

Considerations of this kind led me, in 1871, to look to the modern composite candle as a substitute for the Berzelius blowpipe lamp, supplied with Plattner's Freiberg apparatus, which I had used for twelve years. The candles then used for blow-pipe operations were, indeed, in no respect different from those used for illuminating purposes. How Von Engeström, Bergmann, and the more modern pyrologists who are said to still use common candles for blowpipe work, contrived to do anything useful with them, I fail to understand. With even a small wick in the *centre* of the candle, which, of course, must be turned on one side to prevent it from stopping the blast, the heat radiation from the blowpipe-pyrocone melts the tallow or wax from that side more rapidly than the remainder of the circumference melts, so that a deep channel is soon formed, down which the fluid fuel runs, leaving the wick "high and dry." The consequence is that the pyrocone becomes "thready," from the burning of dry carbonaceous particles eliminated from the wick, and when it is cut down a mass of unconsumed tallow almost covers it at one side.

I therefore adopted the plan of having the candle made with a thick, and even double, wick, placed at one side instead of in the middle of the fuel, and in order to supply more of the latter, I had my candles made a prismatic instead of a round shape. I placed a thick collar of a good conducting metal, such as zinc, round the

edge of the candle, just under the wick, in order to conduct away and diffuse through itself the vibrations of heat. At first I had a series of these metallic collars, and proposed to remove them as the candle burned down; but I afterwards found that one or two good thick zinc collars would be sufficient.

Here is a candle from my cigar blow-pipe case which I am at present using, and another unused one, as made for me by Price & Co. of Battersea.

(4) CANDLE SCISSORS.

In Plattner's apparatus scissors are supplied for cutting the lamp-wick, which of course can also be used for other purposes, *and also* a pair of pliers for squeezing the wick together, and pressing it in any direction; these latter cannot be used, from the dirty state into which they get, for anything else. I use these two articles combined into one—*i. e.*, a pair of ordinary scissors with knobs at the end. This also goes into my cigar blow-pipe-case.

(5) ORDINARY WATCHMAKER'S PLIERS,

with a piece of wire-strapping round them, to enable them to act as holders of platinum wire supports, and they also act as the best cleaners of the wire by drawing the latter from between the pressed flat sides.

(6) TWO AGATE SLABS FOR GRINDING POWDERS.

I have here got instead, a small Freiberg agate mortar, with a pestle made from an agate pen, as I had no slabs small enough to pack away in this cigar-case.

(7) REAGENTS. BORIC ACID.

It has always seemed to me as though blow-pipe workers, or, as I call them, "Pyrologists," could no more profess to begin analytical operations by using a *salt* as reagent, than the analytical chemist could say he intended to begin his solution-work by using sodium nitrate instead of nitric acid. By employing boric acid instead of borax, therefore, in 1869, I at once obtained a series of new, very pretty, and important reactions, especially in the case of the alkaline earths, which formerly used to be the weakest part of blowpipe analysis; now, they are one of the easiest. Space and time do not allow me to describe these reactions here; and, unfortunately, I have brought no boric acid with me here in order to illustrate them; but here is a little German-silver cigar-light box in which the acid is kept, as it does not thus deteriorate. This also goes into the cigar-case.

Phosphoric acid is another of my new reagents (when I say "new," I mean that they are now 12 years old, but new in the sense that they have not been as yet generally adopted.) I use it instead of the old reagent "microcosmic salt." It affords, with several oxides before the blowpipe, new and interesting colors, as in the case of cobalt oxide, which imparts to it a very fine and pure violet instead of the ordinary blue. Of course, when a sufficient quantity of soda to form metaphosphate of sodium, or microcosmic salt after the ammonia has been driven off, has been added, the bead becomes blue, and this fact enables it to be used as an alkalimeter. It is the only reagent which requires to be kept in a stoppered bottle; and is such a powerful acid before the blowpipe that gold leaf is rapidly dissolved in it, yielding a brilliant purple bead. It affords, with iron oxide, a bead the color of watery blood. This ends the list of things packed in the cigar-case.

(8) A COMPASS IN WHICH THE NEEDLE POINTS E. AND W.

This is made by bending an ordinary magnetized needle in the centre until the points are opposite, like a lady's hairpin. It is, in fact, an ordinary horseshoe-magnet suspended, and such a magnet suspended swings E. and W. for a very obvious reason. It might prove useful in Arctic voyages, as such a needle would probably possess little or no "dip." If you bend an ordinarily magnetized needle at a right or any other angle, and suspend it from or on its centre of gravity, a line bisecting the angle will point E. and W., and it was such a needle I first made in order to find a very delicate test for traces of iron in ores. The more open or obtuse the angle, the more delicate this test is. I call it the "Equatorial Needle.' With a right-angled equatorial needle you can detect the mere trace of iron in the ore *Molybdenite*.

(9) AN ALLOY-BUTTON OF GOLD AND SILVER IN WHICH THESE METALS HAVE BEEN PARTLY SEPARATED BY THE BLOWPIPE ALONE.

Many years ago I found that, if you heat an alloy of two or more metals very gently with the blowpipe, so as not to promote fusion, in which case the ball spins round, and all the component metals are mixed again—that one nearly pure metal invariably leaves the others, and approaches the source of heat. This is a case of gold and silver alloy, in which the silver has approached the source of heat, but the process can be admirably illustrated in the case of a common bronze pin, in which the tin approaches the source of heat, while the copper remains in the background. Such a process might obviously be found useful in metallurgy on the large scale.

ASTRONOMY.

To the Editor of "SCIENCE."

On the early morning of June 30, 1881, the definition was very good. On no other occasion was *Comet B*, 1881, seen so clearly. As it appeared in our 8¼-inch refractor, it presented some peculiarities which I have not noticed in any published drawings, and therefore mail you the enclosed.

The prominent features were an unsymmetrical pear shaped coma surrounding the nucleus, two streams on either side, and one directly opposite the tail, which blended with the envelope. Around the whole was a very faint secondary envelope.

Very respectfully,

ISAAC SHARPLESS.

HAVERFORD COLLEGE OBSERVATORY, *September* 1, 1881.